nasals; supratemporal small, intercalated in the cranial wall; vestiges of hind limbs), the latter a family which forms a passage from the Boidæ to the Uropeltidæ, agreeing with these in the physiognomy and scaling, with the former in the presence of vestiges of pelvis, whilst the skull is exactly intermediate.

The most interesting part of the book is that in which Mr. Boulenger divides and subdivides the family of Colubridæ. Of this, therefore, we may give a somewhat more detailed account. He divides this large family, containing the bulk of the Ophidia, into three parallel series:—

(1) Aglypha. All the teeth solid, not grooved. Harmless.

(2) Opisthoglypha. One or more of the posterior maxillary teeth grooved. Suspected, or poisonous to a slight degree.

(3) Proteroglypha. Anterior maxillary teeth grooved or perforated. Poisonous.

"In each of these series," says Mr. Boulenger, "we have a more or less perfect repetition of forms, due to adaptation to the various modes of life." Of the series represented in the Indian fauna, the Aglypha include the Colubrinæ and Acrochordina; the Opisthoglypha include the Dipsadinæ and Homalopsinæ; the Proteroglypha include the Elapinæ and Hydrophiinæ, all the former being adapted to terrestrial, all the latter to aquatic life. How deeply classification is affected by the new division here offered by Mr. Boulenger, we may see particularly in his record of the Indian genera of Colubrinæ, which we give, as a specimen, in the natural order:—Calamaria, Xylophis, Trachischium, Blythia, Aspidura, Haplocercus, Lycodon, Hydrophobus, Pseudocyclophis, Polyodontophis, Ablabes, Coronella, Simotes, Oligodon, Lytorhynchus, Zamenis, Zaocys, Coluber, Xenelaphis, Dendrophis, Dendrelaphis, Pseudoxenodon, Tropidonotus, Helicops, and Xenochrophis. Hitherto these genera have been included in the families and sub-families Calamariidæ, Lycodontidæ, Oligodontidæ, Colubridæ (with Coronellinæ, Trimerorhinæ, Colubrinæ, Dryadinæ, and Natricinæ), and Dendrophidæ; at least, therefore, in five different families. In how thorough a way the author has set to work in the limitation of genera also, we see from his combination of the genera Elaphis, Calopeltis, Cynophis, Compsosoma, Spilotes, and Gonyosoma in one great genus Coluber. The green, arboreal species referred to Gonyosoma stand in the same relation to Elaphis and Compsosoma as the green Ablabes (Cyclophis), Dipsas, or Trimeresurus to the other species of those genera. There can be no doubt that the phenomena can be more readily reviewed if these closely related forms are placed in one and the same genus than if genera or even sub-families are assumed, simply because some species have adapted themselves to arboreal or sub-arboreal habits, and have in consequence taken on a green colour. The group Acrochordinæ contains five genera—three with well developed ventral shields, viz. Stoliczkaia, from the Khási Hills; Xenoderma, from Java and Sumatra; and Nothopsis, from the Isthmus of Darien: two without ventrals, viz. Aerochordus, from the Malay Peninsula and Archipelago; and Chersydrus, from India to New Guinea. Mr. Boulenger deals with the Dipsadinæ in the same drastic manner. Of Indian genera, the following are placed by him in this subfamily: Dipsas, Elachistodon, Psammodynastes, Psammophis, Dryophis, and Chrysopelea—genera, therefore, which in the old classification were included in Dipsadidæ, Rhachiodontidæ, Psammophidæ, Dryophidæ, and Dendrophidæ. By devoting more attention than previous investigators to the structure of the skull and the dentition, to the number, form, and length of the teeth, and the form of the pupils, the pholidosis of the head, the structure of the scales, and the colour—to which, however, he does not attribute equal importance as a limiting principle—the author gives, it seems to us, a far better and more comprehensive arrangement than his predecessors. However, it cannot be denied that, satisfactory as the present attempt is, the problem of a systematic division of the *Colubridæ* is still far from being solved.

In the group of sea-snakes, Mr. Boulenger divides more sharply the genera Enhydris, Hydrophis, and Distira. The very differently formed dentition in these genera (in spite of their great resemblance in the form of the head, colour, and mode of life) seems to show that they have sprung from three different terrestrial genera, and that their present resemblances are only the result of their adaptation to their life in the water. Thus Platurus is to be regarded as a Hydrophid which may be traced as a direct descendant of the terrestrial Elapinæ.

Finally, Mr. Boulenger's work enriches science with a considerable number of new genera and species, especially in the sub-order of the Snakes; but space will not permit further reference to details. As the book will be indispensable to every naturalist and every layman who may wish to obtain information about the tropical Indian animal world, the few remarks we have given may suffice. The chief value of a work like this lies in its sharp diagnoses, and in its synoptical tables for genera and species, which enable the observer to determine with confidence the form which may be before him. The fact that the author gives a concise view of geographical distribution, and offers short biological remarks regarding some genera and even species, adds to the scientific importance of the work. For many years this will be the standard book for our knowledge of the Reptiles and Batrachia of India; and its moderate price ought to ensure for it a wide circulation both in India and in Europe. There are still many species about which we know little, and some of Mr. Boulenger's readers ought to be, and no doubt will be, stimulated to provide the desired observations and descriptions. The book should find a place in the luggage of every educated traveller who starts for India.

O. BOETTGER.

EDUCATION IN ALABAMA.

History of Education in Alabama, 1702–1889. By Willis G. Clark. (Washington: Government Printing Office, 1889.)

THIS volume forms one of the admirable series of historical monographs published by the Central Bureau of Education at Washington, and edited under the special supervision of Prof. Herbert Adams, of the Johns Hopkins University at Baltimore. It should be explained that in the United States there is nothing analogous to our Education Department, Congress and the Federal Government having no control or jurisdiction over schools, and each State and city making its own laws and administrating its own educational funds. But Congress established in 1866 at Washington a Central Bureau for the purpose of collecting and publishing statistics; and this Bureau, under the energetic direction of successive Commissioners, has sought to increase its own public usefulness by publishing from time to time valuable works on the history and philosophy of education, and particularly, as various practical problems have presented themselves relating to technical, musical, or physical education, it has gathered together, in pamphlets or circulars of information, the best testimony and opinion which could be obtained on the several subjects.

Prof. Adams's own contributions to the series, notably his "History of the College of William and Mary," and his "Essay on the Study of History in American Colleges and Universities," have been widely read and esteemed in the States; and among the other works included in the series, those of Dr. Bush on "Education in Florida," of Mr. Jones on "Georgia," and of Messrs. Meriwether and Smith on "North and South Carolina," have told with care and fulness the story of educational progress in the Southern States. The present volume relates to Alabama, and is written by Mr. W. G. Clark, of Mobile, who, as sometime President of the University, and as Chairman of the School Committee of the State, is exceptionally qualified for his task, and has been able, with the help of photographs and statistical tables, to present to the reader, not only an interesting historical sketch, but also a full account of the present organization and resources of education in the State. Many of the details in a book of this kind have necessarily a local and personal interest only. Mingled with them, however, are a few facts which may possess significance for English readers. The chief of these relate to the origin and history of the University, the present provision for scientific and technical training, and the general educational condition of the State.

The University was founded in 1821. The general law of the Union—that in all new States one-sixteenth of the public land shall be set apart for schools—dates from 1785, but it was not applied to the Alabama territory till the Act of 1818, which further provided that one entire township should be reserved for the support of a seminary of higher learning. The prudent administration of this large property would doubtless have secured for the State ample provision for learning in all its several departments; but the early history of the University is a melancholy record of mismanagement and neglect. The lands were unwisely sold, sometimes at 8 dollars per acre, the proceeds of the sale were not well invested, accounts were confused, and financial embarrassment followed. To add to these misfortunes, the University appears to have suffered grievously from frequent outbursts of lawlessness and even rebellion on the part of the students. Though the number scarcely exceeded 100 in its best days, and though the annual "output" of graduates averaged little more than 10, the University seems to have striven hard to keep up a high standard of teaching and scholarship, and has been officered from time to time by distinguished men. One is struck, in looking down the list, by observing that, though the University never professed any creed, or sought to maintain a pronounced religious character, many of its presidents and the majority of its professors appear to have been ministers of religion. It is very characteristic of the republican equality which prevails in the United States in regard to religious sects that in 1830, when the buildings of the University were completed, the offer of the principalship was at first made to a Presbyterian divine; that, on his refusal, Dr. Woods, a Baptist clergyman, accepted the office; and that the inaugural services were held in the Episcopal church, the minister of which, with the Governor of the State, took part in the proceedings. Additional buildings, comprising an observatory and a noble library, were added from time to time, but the war of 1861–65 completely interrupted the work of the University, and for a time well nigh ruined it. All the students enrolled themselves in the Confederate army, and after a disastrous struggle, the issue of which is well known, a body of the Federal cavalry, specially despatched for the purpose, set fire to all the public buildings of the University, and reduced them to smouldering heaps of ashes. The librarian, in the hope of changing the purpose of the commanding officer with reference to the destruction of the library, led him thither, unlocked the doors, and showed him the valuable collection of books. "It is a great pity," said the officer, "but my orders are imperative. But I will save one volume, at any rate, as a memento of the occasion." He entered, and seizing a copy of the Koran, withdrew from the building, and ordered it to be set on fire at once. In this way property valued at 300,000 dollars was hopelessly destroyed. It was not till 1870 that other buildings were completed and the College exercises were regularly resumed. As now constituted, the University includes two general departments, of which the first is academical and the second professional. In the former there are ten different schools—Latin, Greek, English, Modern Languages, Chemistry, Geology and Natural History, Natural Philosophy and Astronomy, Mathematics, Philosophy and History, and Engineering. In the department of professional education there are three schools—international and constitutional law, common and statute law, and equity jurisprudence. The rules of the Supreme Court of Alabama authorize the graduates of this department to practice in all the courts of the State, on simple motion, without further examination. The University also provides a special course of instruction under the heads of military art and science, military law and elementary tactics.

Besides the University, Alabama is provided with a remarkable institution of a technical character, called the Agricultural and Mechanical College. It is situated in the town of Auburn, and is endowed with the proceeds of the sale of 240,000 acres of land. Since its foundation in 1872 it has increased in popularity and usefulness, and has become a school of industrial science or a polytechnic institute. Its departments are agriculture and horticulture, mechanic arts, practical chemistry, physics and mineralogy, botany, engineering and surveying, drawing, and military tactics. In the mechanic arts and practical chemistry, its appliances are particularly excellent. There is a wood department in a large hall, provided with a 25 horse-power engine with indicator, planes, circular saw, band saw, scroll saws.

a buzz planer, twenty work benches, with full set of lathes and carpenters' tools required for instruction. A brick building with two large rooms has been constructed specially for instruction in working iron. One of these is equipped with twelve forges, and tools necessary for a forge department; the other with a cupola furnace, moulding benches, and special tools for use in a foundry. The machine is equipped with eight engine lathes with appropriate tools, and a chipping and filing department is arranged, with benches and vices for twelve students. A five horse-power dynamo furnishes light to the mechanic, art laboratory, and other halls, and it is designed to supply the different laboratories with electricity from this source.

Although there are these signs of enterprise, and although the public school system of the State includes elementary schools, high schools for girls, and normal colleges for teachers, Alabama proves, when its educational statistics are examined, to be one of the most backward States in the Union. The latest returns of the United States Commissioner show that the public schools are open on an average only 79 days in the year, and that the average attendance is only 63 per cent. of the number enrolled. The sum annually expended on education is not large, and amounts only to an average of 4 dollars 17 cents per head on the number of scholars. Of the total school revenue, 20 per cent, is derived from land and real estate, 55 per cent. from State taxation, and 24 per cent. from poll taxes, licenses, and other local imposts. Special provision was made in 1867 establishing separate schools for coloured children, who are numerous and increasing in number in this as in most of the Southern States. The last returns show a total of 212,821 coloured children of school age, of whom 98,919 are enrolled in the public schools set apart for them, while 66,424 are on an average in daily attendance during the school year. The year, however, is one of 67 days only. The average cost to the State of the coloured pupils is 2 dollars 10 cents.

These particulars sufficiently indicate the very exceptional conditions under which education is carried on in one of the most important of the South Central States of America, and will show to any student of the subject how much of interesting material has been accumulated in Mr. Clark's well arranged and well illustrated book.

CHEMISTRY FOR BEGINNERS.

Elementary Systematic Chemistry for the Use of Schools and Colleges. By William Ramsay, Ph.D., F.R.S. (London: J. and A. Churchill, 1891.)

AMONG the large number of text-books of elementary chemistry written for the use of schools, this volume will take its place with the very few that are not specially designed to prepare the student for some examination. It is further to be distinguished as having the classification and order of treatment of the elements based upon their periodic arrangement. The author deserves the thanks of those interested in the matter for making this experiment, whether the result be regarded as successful or otherwise. He states in the preface that he hopes "that the method of treating the subject of chemistry adopted in this short sketch may help to demonstrate the value of its study as a training in classification, and as a means of developing the reasoning powers." Certainly this is desirable, and the volume tends in this direction. We find, for example, the preparation of the elements treated under such headings as "Electrolysis of a Compound," "Decomposition of a Compound by Heat," &c., and there is much advantage in comparing the processes that serve for the isolation of the elements in this manner. But the first aim of a knowledge of chemistry is not to develop the reasoning powers. It is rather to give the student more exact ideas than he would otherwise have of the constitution and properties of matter, and it is important to get into his mind not simply the relationships that substances bear to one another, but a definite idea of each substance and its properties. We think that an inspection of the volume before us will confirm the experience of the past that an elementary text-book does well to aim, above all things, at presenting a distinct, and, as far as may be, complete description of each substance, leaving the classification of methods and reactions to the judgment of the teacher or the ingenuity of the student when it is impossible to include both aspects of the matter. Taking oxygen as an example, we are in the habit of finding a chapter in which the methods that serve for its preparation, and its more important properties are set forth in a connected and convenient manner. But in this volume the directions for the preparation of oxygen occupy a few paragraphs in a chapter entitled "Decomposition of a Compound by Heat," at p. 73, while the properties of oxygen are not described till we get to p. 93. To say the least of it, it would be very inconvenient for a student, after having prepared his oxygen, to busy himself with the preparation of sulphur from pyrites, the preparation of magnesium, aluminium, boron, silicon, hydrogen, several metals, the properties of hydrogen and about seventeen metals, besides boron, carbon, nitrogen, phosphorus, and arsenic, before he comes to a practical investigation of the properties of his oxygen.

The author has endeavoured to treat first of the elements, and subsequently of compounds. But elements and compounds are interdependent, and it is obvious that such a separation is practically impossible. We think it is unwise to attempt it, unless, indeed, chemistry is to be degraded into a mere "means of developing the reasoning powers." If education is for this purpose only, the student of a foreign language would do well to devote himself entirely to its grammar, and leave the vocabulary for those who desire knowledge for its own sake.

The difficulty of finding a good beginning place in the teaching of any science has been obvious to all those who have undertaken the task. If children are to be taught, they must be led by slow degrees from what they know to an expanded and fuller knowledge of the matters they are already acquainted with, and so onwards. The periodic law is beyond the grasp of a young student, and the only valid reason that should allow his course of work to be guided by it would be that the subject was thereby rendered more agreeable or more intelligible to him. It does not appear that the periodic law will be able to fulfil this new function.

Looking at the book more in detail, we notice that 60 pages are devoted to chemical physics, 144 pages to